The MOVES Degree & the MOVES Research Program

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The MOVES Institute
Naval Postgraduate School

The MOVES Degree

A little history ...

The MOVES Institute
Naval Postgraduate School

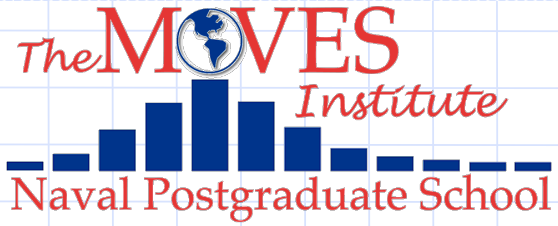
- MOVES began in March, 1996 with the M.S. degree program
- The MOVES Ph.D. was approved in March, 1999
- Originally intended to be pragmatic mix of Computer Science and Operations Analysis
- MOVES has now evolved to become its own field.

Program objectives

The MOVES Institute
Naval Postgraduate School

- Our students go on to manage M&S systems, not build them
- We believe this means that they have to know how to architect next-generation M&S systems
- Q: How can someone manage and/or architect a system who does not know the fundamentals of what is being built?
- A: They can't.

Where do our students come from?



- MOVES defines
  - the Navy's subspecialty in modeling and simulation (6202/xx99 P-code),
  - the Marine Corps' modeling and simulation subspecialty (MOS 9625),
  - the US Army's Simulation Operations functional area (FA-57), and
- MOVES supports the International M&S community (Turkey, Greece, Singapore, Germany)

MOVES MS Program

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Naval Postgraduate School

Mathematical Fundamentals

Matrix algebra, single variable calculus, intro to finite math, probability & statistics, statistics & data analysis, advanced data analysis

Programming

Objects & programming, data structures & intermediate programming, C++ as a 2nd language, artificial intelligence

Systems & Networks

Computer systems principles, operating systems, computer communications & networks

Modeling & Simulation

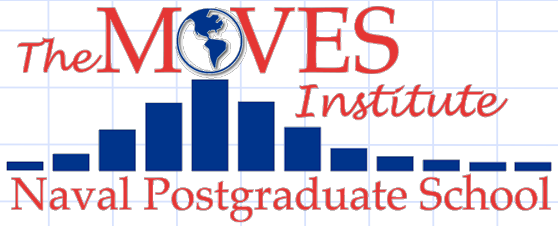
Simulation & training, stochastic models & military applications, system simulation, intro to combat modeling, survey of combat models, management of M&S development

Virtual Environments

Computer graphics programming, computer graphics modeling, virtual environment technology, human factors in system design

MOVES Blocks

Combat Modeling
Networked Visual Simulation
Web-Based Simulation
Agents & Cognitive Modeling
Training Systems
Human Factors
Physically-Based Modeling
Optimization
Management & Acquisition
SIWCC
JPME



The MOVES Research Program

Mission

The MOVES Institute
Naval Postgraduate School

Research, application and education in the grand challenges of modeling, virtual environments and simulation.

- Web-Based Simulation
- Computer-Generated Autonomy
- Human Performance Engineering & Game-Based Simulation
- Combat Modeling & Analysis

Organizational Structure

The MOVES Institute
Naval Postgraduate School

Director

- Michael Zyda

Technical Directorate

- John Hiles - Computer-Generated Autonomy
- Don Brutzman - Web-Based Simulation
- Rudy Darken - Human Performance Engineering & Game-Based Simulation
- Ted Lewis - Homeland Security
- LtCol Tom Cioppa, USA - USA TRAC Monterey

MOVES Size

68 NPS faculty/staff participate in our weekly meetings, faculty/staff from all four NPS schools.

- We are the largest interdisciplinary group on campus.
- We are paying those faculty/staff from MOVES reimbursable funding, budget pages totaling $14M.

We are working with approximately 70 students from all four NPS schools.

Communications

The MOVES Institute
Naval Postgraduate School

Weekly Meetings

- Monday -
  - Agents & Combat Modeling
- Tuesday Noon
  - Human Performance Engineering & Game-Based Simulation
- Wednesday Noon -
  - Web-Based Simulation
- Thursday Noon - MOVES Brown Bag
- Thursday 3pm - Directors

Communications cont.

The MOVES Institute
Naval Postgraduate School

- MOVES Institute Mailing List
- Focus Group Mailing Lists
- Directors Mailing List
- Weekly Research Project Meetings
- MOVES Institute Open House 24 - 26 August 2004
- MOVES Institute Annual Report
- Web site

Advisory Board

Advisory Board provides guidance on funding for research and products.

- RADM Steven Tomasczeski, USN - N61
- RADM Lee Kollmorgen, USN (ret)
- CAPT Dennis McBride, USN (ret), PhD - President, Potomac Institute
- COL Jack Thorpe, USAF (ret), PhD
- Dr. Harold Hawkins, ONR
- Gilman Louie, In-Q-Tel
- LCDR Dylan Schmorrow, USN – ONR VIRTE Program Manager & DARPA Program Manager
- Michael Kapp - Founder & President Time Warner Special Projects (ret)
- Stephen Moore,Technical Director J7, JFCOM

Advisory Board cont.

The MOVES Institute
Naval Postgraduate School

COL Mike Finnern, USAF - Director, DMSO

John Moore - Director, Navy Modeling & Simulation Management Office, N61M

Jim Weatherly - Deputy Director, Navy Modeling & Simulation Management Office, N61M

Dr. Estrella Forster, Science Advisor, Third Fleet

Dr. Mike Bailey - Technical Director, USMC Training & Education Command

Dr. Mary Fischer, Air Force Agency for Modeling & Simulation

Dell Lunceford - Director, AMSO

COL Mike McGinnis, USA - Chair, USMA Department of Systems Engineering

Dr. Bowen Loftin - Old Dominion University, Director Virginia Modeling & Simulation Center

Dr. Mark Pullen, George Mason University

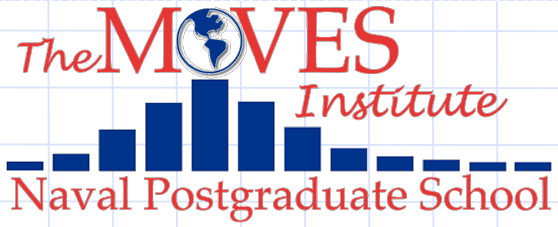
Dr. Randy Shumaker - Director, UCF Institute for Simulation & Training

RADM David Bill, USN (ret), NPS Foundation

Directions

We take a look at MOVES Institute directions by looking at the titles of presentations at the open house.

MOVES Open House



August 24, Tuesday

Welcome

1:00–1:45pm This Year in MOVES, Michael Zyda, MOVES Director

1:45–2:00pm Program Officer's Annual Review, CDR Joe Sullivan, USN

Web-Based Simulation

2:00–2:20pm Semantic Web Technologies for Military M&S, Curt Blais, MOVES

2:20–2:35pm Online Mentors for Arabic Language Training and Iraqi Cultural Familiarization, Jeffrey Weekley, MOVES

2:35–2:50pm High-Performance Computing (HPC), Don McGregor, Maj. Christos Daillidis, Hellenic Army, Don Brutzman, MOVES

XMSF Presentations

2:50–3:10 Extensible Modeling and Simulation, Framework (XMSF) Project Update, Don Brutzman (MOVES), Mark Pullen (GMU), Andreas Tolk (ODU/VMASC), Katherine Morse (SAIC)

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 24, Tuesday

Web-Based Simulation
XMSF Presentations

3:10–3:40pm Break

3:40–4:00pm Quick-look report on the XMSF Developers' Deep-Dive Workshop, Brutzman, Pullen, Tolk

4:00–4:20pm XMSF Profiles, Katherine Morse

Invited Speaker:
4:20–4:50pm DMSO R&D Directions in Modeling and Simulation, Sue Numrich (Deputy Director, Technology, DMSO)

5:00pm Cocktail Reception, MOVES classrooms (ME 275, 285)

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 25, Wednesday

Web-Based Simulation

XMSF Exemplar Projects

8:30–8:40am XMSF Exemplar Projects. LT Rosetti, USN: Sonar Visualization

8:40–8:50am XML-based Tactical Chat (XTC), Don McGregor, LT Matt Mackay, USN, Don Brutzman

8:50–9:00am Autonomous Underwater Vehicle (AUV) Workbench, LCDR Duane Davis, USN

9:00–9:10am XML Schema-based Binary Compression (XSBC), LT Terry Norbraten, USN

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 25, Wednesday

Web-Based Simulation

XC2I Sessions

9:10–9:25am XC2I Overview and Viewer/Controller Technology, Andreas Tolk

9:25–9:40am XC2I Web Service Interest Management, Katherine Morse

9:40–9:55am XC2I Application of XMSF Overlay Multicast, Mark Pullen

9:55–10:25am Break

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 25, Wednesday

Invited Speaker:

10:25–11:05am JFCOM R&D Requirements for Modeling and Simulation, Stephen Moore (Director, Joint Training, Analysis, and Simulation Center and Deputy Joint Force Trainer, Capabilities, Director of Office of Prototyping Oversight, JFCOM)

Combat Modeling and Analysis

11:05–11:15am Validating Computational Human Behavior Models: Consistency and Accuracy Issues, MAJ(P) Simon Goerger, USA

11:15–11:30pm Common Maneuver Network Representation Toward Interoperability of C4ISR and M&S, Niki C. Goerger (TRAC-Monterey)

11:30–12:00pm TRAC-Monterey Collaborative Research, LTC Tom Cioppa, USA (TRAC-Monterey)

12:00–1:15pm Lunch

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 25, Wednesday

Combat Modeling and Analysis

World-Class Modeling (WCM) Presentations

1:15–1:35pm M&S Transformation, Don Brutzman (MOVES), LCDR Phillip Pournelle, USN (OPNAV N81)

1:35–1:50pm NSS/Simkit/CombatXXI Integration through Web Services, John Ruck (Rolands and Associates)

1:50–2:05pm Viskit Discrete Event Simulation Development Tool and the Simkit Model Repository, Arnie Buss (MOVES), Mike Bailey (MOVES)

2:05–2:20pm Special Operations, Joint Force Employment Options, and Improved Strike Analyses, Alex Callahan (MOVES and NPS Information Systems) and CAPT Starr King, USN (NPS Operations Research)

2:20–2:35pm Logistics Modeling, David Schrady (NPS Operations Research)

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 25, Wednesday

Computer-Generated Autonomy

2:35–2:55pm Compound Multiagent Systems in MOVES Research, John Hiles (MOVES)

2:55–3:10pm Metaphoric Programming: Insights and Applications, LTC Rene Burgess, USA, Army War College

3:10–3:40pm Break

3:40–3:55pm Machine Learning of Nonverbal Communication, Craig Martell (MOVES, NPS Computer Science)

3:55–4:10pm Simulation of Massive Persistent Sensor Networks, Neil Rowe (MOVES, NPS Computer Science)

4:10–4:20pm Applying Tactical Decision Making to Closed-Loop Simulations, LTC Joe Chacon, USA

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 25, Wednesday

Computer-Generated Autonomy continued

4:20–4:30pm Event Prediction for Modeling Mental Simulation in Naturalistic Decision Making, LtCol Dietmar Kunde, German Army

4:30–4:45pm Raising Agents, Chris Darken (MOVES)

4:45–4:55pm Agent Perception on Graphics Hardware, Capt. Ray Pursel, USMC

4:55-5:05pm Agent Target Acquisition Based on Color and Texture, LT Steve Correia, USN

Demo Night

5:15pm Demos: second floor of ME building, MOVES spaces: ME 275, 285, 212A, 212B, and hallways)

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 26, Thursday

Invited Speaker

8:30–9:00pm M&S Research and Educational Programs at the Virginia Modeling, Analysis & Simulation Center, Bowen Loftin (Director, ODU VMASC)

Human-Performance Engineering and Game-Based Simulation

9:00–9:20am Backing off the Bleeding Edge: Revolutionary Change Using Today's (Not Tomorrow's) M&S Technology, Rudy Darken (MOVES)

9:20–9:35am Simulation, Gaming, and Open Source: The P51 Project, Erik Johnson (MOVES)

9:35–9:50am Filling in the Blanks: Core Components of the P51 Engine, Andrzej Kapolka (MOVES)

9:50–10:00am SCoT-DC: Spoken Conversational Tutoring on DC-Train Simulated Damage Control, Elizabeth Owen Bratt (SRI International)

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 26, Thursday

Human-Performance Engineering and Game-Based Simulation continued

10:00–10:30am Break

10:30–10:45am Inertial/Magnetic Body Tracking, Eric Bachmann (Miami University)

10:45–10:55am A Training Effectiveness Study of the ISMT-E Marksmanship Trainer, Major Walt Yates, USMC

10:55–11:10am Modeling, Simulation, and Games in the National Exercise Program for Homeland Defense and Security, Julia Loughran (Institute for Defense Analyses) and Rudy Darken

11:10–11:20am Building a Prototype Shipboard Firefighting Trainer using an Open Source Game Engine, Perry McDowell (MOVES)

11:20–11:30am Generate and Enhance Natural Environments or Terrain for Interactive Combat Simulations (GENETICS), Major David Wells, USAF

MOVES Open House

The MOVES Institute
Naval Postgraduate School

August 26, Thursday

Human-Performance Engineering and Game-Based Simulation continued

11:30–11:40am Connected Immersion in VR, Gurminder Singh (MOVES)

11:40–11:55am From Visual Simulation to Virtual Reality to Games, Mike Zyda

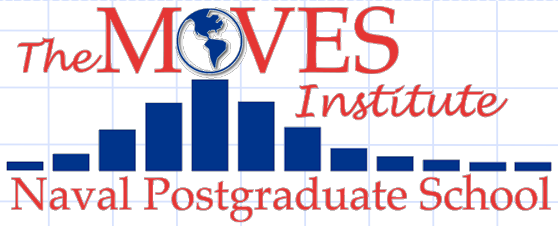
Closing & Final Words

11:55-12:05pm Michael Zyda

MOVES Advisory Board Meeting and Luncheon

12:10-2:00pm MOVES classrooms (ME 275, 285)

Additional Related Events



- XMSF Workshop - 23-24 August 2004
  - http://movesinstitute.org/XMSFopenhouse2004.html
- NPS 50th Anniversary of Computing Symposium - 27 August 2004
  - http://nps.edu

Questions?

The MOVES Institute
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Web site for additional information:

http://movesinstitute.org

MOVES Open House

24 - 26 August 2004